2004 Entomology Project Report - WSDA PUB 805-122
Plant Protection Division, Pest Program
Washington State Department of Agriculture

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2004 Western Washington Delimiting Survey for *Agriotes obscurus* and *A. lineatus* (Coleoptera: Elateridae), Exotic Wireworm Pests New to the United States

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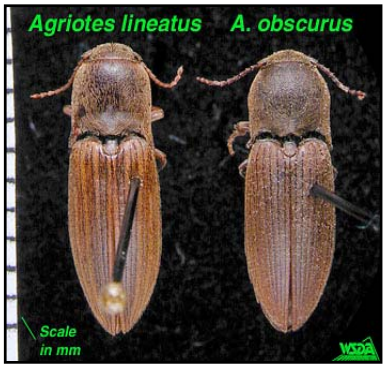
Background

Wireworms are the juvenile stage (larvae) of click beetles (family Elateridae), a diverse group of beetles that includes beneficial as well as plant-feeding species. Pest species live in soil where the tough, wire-like larvae feed on seeds, plant roots, and underground plant parts. Crop damage begins in the spring, when larvae can be particularly destructive of planted seeds. During the summer and early fall, wireworms feed on the developing root systems and stems of many plants, including grains, corn and garden vegetables. Larvae also burrow into the tubers and stems of potatoes and ornamentals such as dahlias, gladioluses and tuberous begonias.

Figure 1. Wireworm larva

Figure 2. Adult Click Beetles



Two European pest wireworms, *Agriotes obscurus* (L.) and *Agriotes lineatus* (L.) (Figures 1 & 2), were known to be present in British Columbia, Canada, since 1950 and *A. obscurus* was found for the first time in the United States near Lynden, in Washington State in 1997 (Vernon and Päts, 1997). In 2000, a preliminary WSDA/USDA-CAPS detection survey of areas of western Washington found both species in several counties along the east side of Puget Sound (Figures 3 & 4, from LaGasa et. al., 2000).

Figure 3. *A. obscurus* Traps 2000

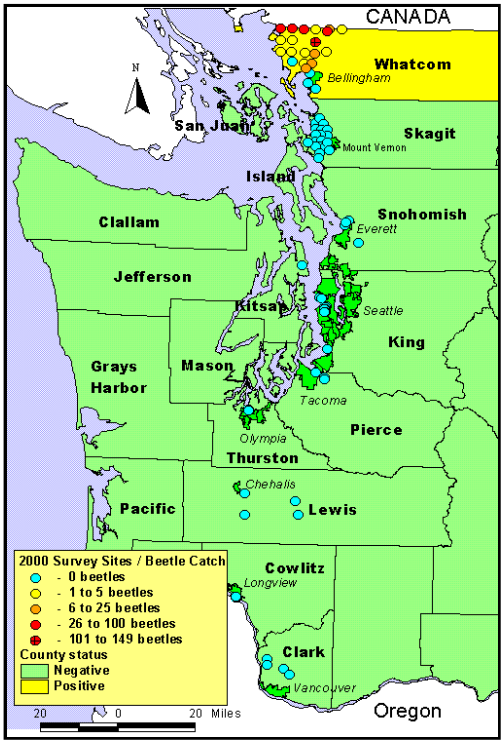
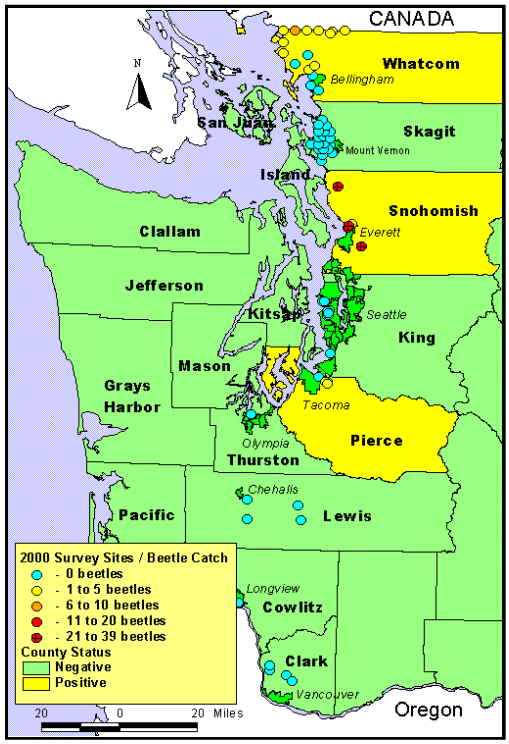


Figure 4. *A. lineatus* Traps 2000



In recent years these two species have become the most important pests of many crops throughout the lower Frasier Valley, causing between $500,000.00 and $800,000.00 in crop losses in 1994 (Vernon, 1998). Both species are major economic pests in Europe and western Asia (USDA APHIS, 1978).

For more information on these pest wireworms, damage, monitoring, and management in the PNW region, a number of internet links and recent publications is included at the end of this report.

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2004 Project Objectives

1. **Delimit *Agriotes lineatus* and *A. obscurus* distribution in selected areas of western Washington.**

- Survey to detect or delimit *Agriotes spp.* in areas adjacent to known populations (in Pierce county) and in the adjacent county (Thurston county).
- Survey to detect or delimit *Agriotes spp.* in Clark county, in collaboration with the Oregon Department of Agriculture to survey the greater Vancouver, Washington / Portland, Oregon port area.

Project Methods and Materials

This one-person field survey used pheromone-traps and lures recently developed by Dr. Bob Vernon (Agriculture Canada) and PheroTech Inc. of British Columbia, Canada. For more information go to:
http://www.pherotech.com/vernon_beetle_trap.html

The trap captures and confines adult beetles that are attracted to a internal pheromone lure and fall in after ascending shallow ramps. Pheromone lure formulation remains proprietary information at this point, but the trap configuration is presented here courtesy of PheroTech Inc. (Figure 5). No kill agent or preservative was used in the traps, which relied on regular servicing to provide specimens in good condition.

Figure 5. Click Beetle Trap

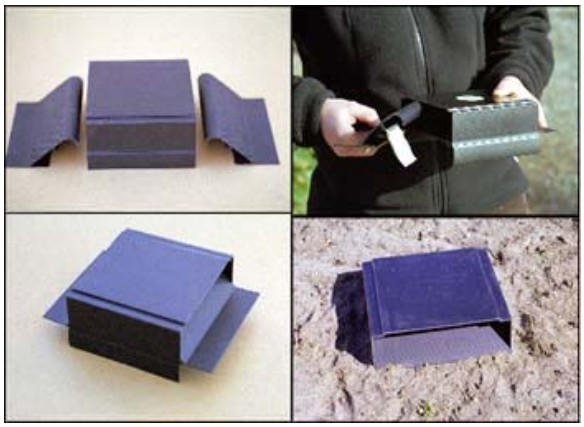


Figure 6. Trap Site Preparation

Physical criteria for trap sites included proximity to areas of turf, pasture, or other grassy locations, which are considered favored wireworm habitat, and protected situations where traps would be less likely disturbed or damaged (Figure 6.). Traps were placed at ground level, with entry ramps flush with or slightly covered by adjacent soil to provide unimpeded beetle entry (Figure 7). Checking and sample collection involved removal of one of the ramp inserts and shaking the trap contents into a tray (Figure 8).

Traps were placed beginning in early March and checked weekly until removal in early June, to coincide with spring adult beetle activity. Survey sites were around port facilities or navigable waterways, and near previous positive sites in Pierce county.

Figure 7. Trap Installation

Figure 8. Checking Trap Contents

In total, 159 sites were trapped in this survey. Trap site numbers and catch status by county are presented in Table 1.

Beetles captured were identified in the WSDA Olympia Entomology Lab and new county record collections were sent to Dr. Paul Johnson, a USDA Systematic Entomology Laboratory identification collaborator at the University of South Dakota, for confirmation (received July 29, 2004).

Project Methods and Materials (Cont.)

Table 1. Total Number of Sites Surveyed and Results by County and Target Pest

County	Sites Trapped / *A. lineatus*	Sites Positive / *A. lineatus* (% Total)	Sites Trapped / *A. obscurus*	Sites Positive / *A. obscurus* (% Total)
Pierce (Tacoma Port Area)	**50**	**27** (54%)	**50**	**5** (10%)
Thurston (Olympia Port Area)	**5**	**2** (40%)	**5**	**1** (20%)
Clark (Vancouver Port Area)	**25**	**0**	**24**	**0**

Project Results and Discussion

Both *A. lineatus* and *A. obscurus* were found at sites in Pierce and Thurston counties, but neither were collected in Clark County (Table 1.). The Pierce County collections of *A. obscurus* represent the first detections in that county, and the Thurston County collections are the first for both species. Survey results by trap site for both target species are presented in figures 9 through 12.

Figure 9. Pierce County *A. lineatus* Survey Sites

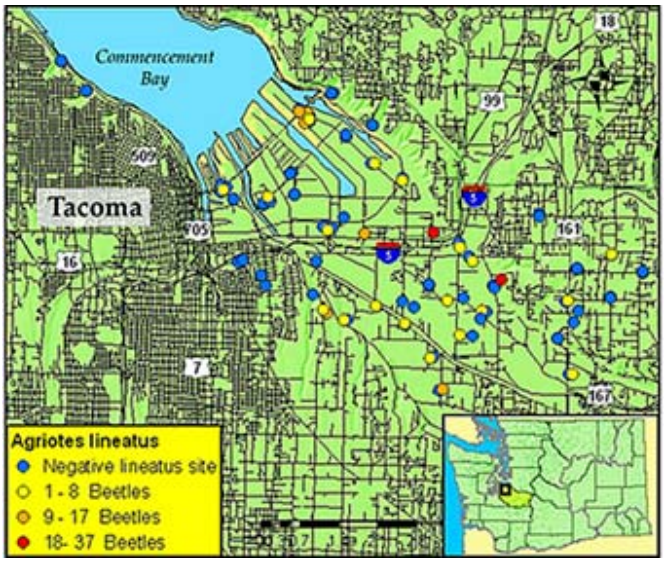


Figure 10. Pierce County *A. obscurus* Survey Sites

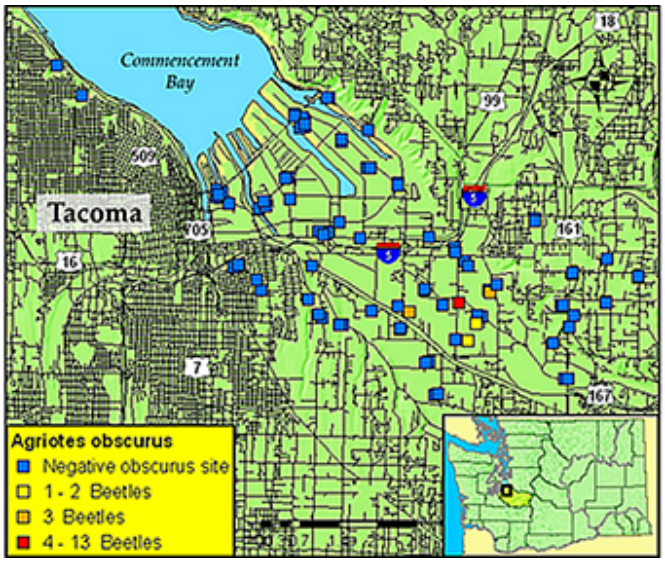


Figure 11. Thurston County Survey Sites

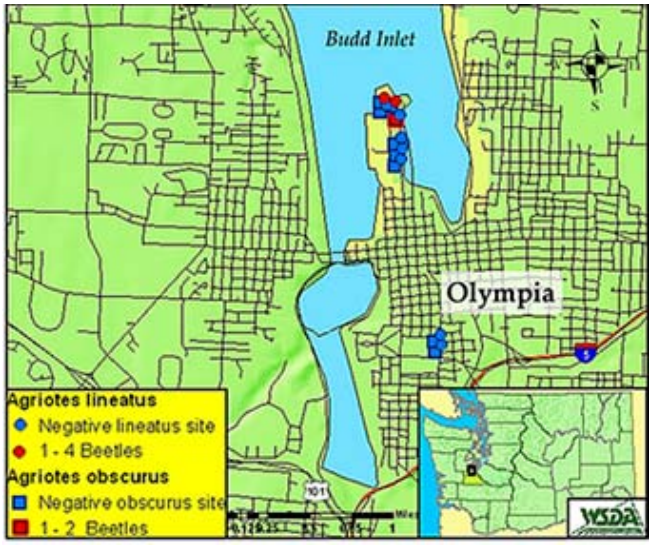


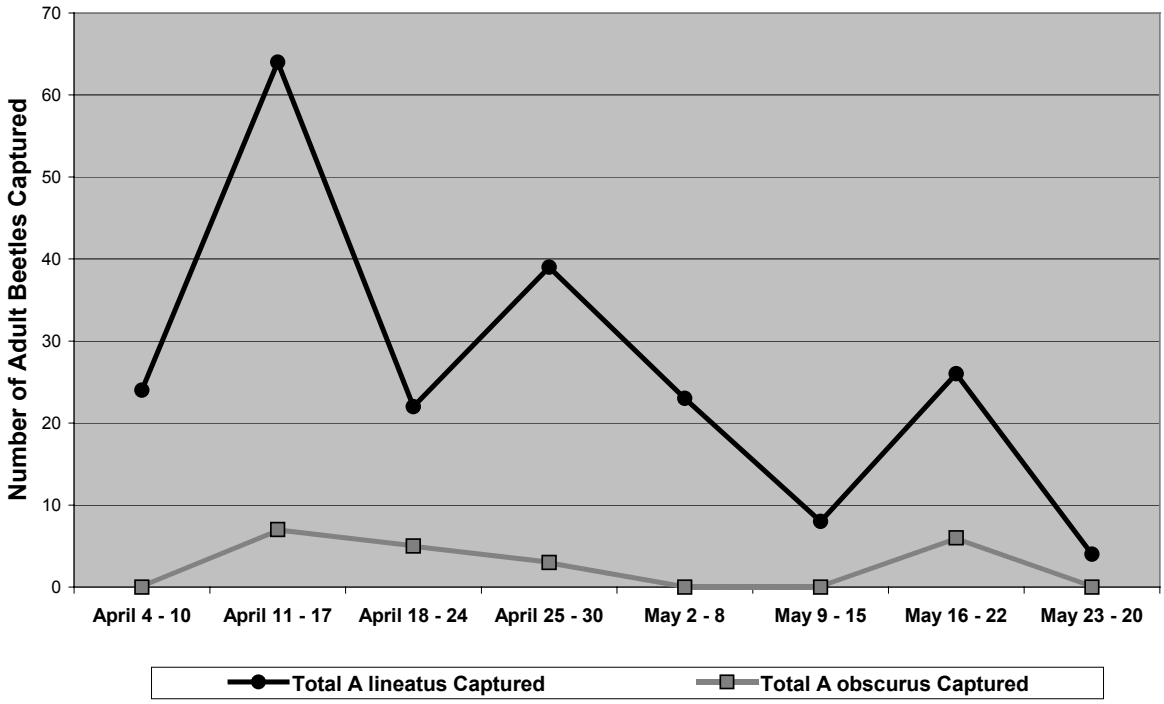
Figure 12. Clark County Survey Sites

Project Results and Discussion (Cont.)

This surveys' collections of both *A. lineatus* and *A. obscurus* at multiple sites in Pierce and Thurston counties continue to suggest both pests may be widely established throughout the Puget Sound area. However, significantly more survey is needed to make that determination. Whether the detected populations in Snohomish (in 2000), Pierce, and Thurston Counties represent natural spread from British Columbia (i.e. are part of a contiguous population) or are the result of independent introductions has not been determined.

Capture data does indicate survey timing was appropriate to record adult beetle phenology (emergence timing) in Pierce County this year, and the total weekly beetle capture at all Pierce County trap sites is displayed in figure 13. Adult beetle activity for both species apparently peaked about the second week in April and gradually declined until late May

Figure 13. *Agriotes lineatus* and *A obscurus* Captured by Week in Pierce County in 2004.



Larger format versions of graphics included in this report, as well as other images of survey activities and survey sites are available from the author via the contacts at the end of this report.

Pertinent Literature (and Links to additional wireworm information)

LaGasa, E., B. Vernon, J. Wraspir, P. Hertzog, and H. Kamping 2000. 2000 Western Washington Exotic Wireworm Survey, a Preliminary Detection and Delimiting Survey for Agriotes obscurus and A. lineatus (Coleoptera: Elateridae), a WSDA 2000 Entomology Project Report – WSDA PUB 047 (N/1/01)

USDA APHIS 1978. LINED CLICK BEETLE Agriotes lineatus (L.) and A WIREWORM Agriotes obscurus (L.) in PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES or of Limited Distribution, No..5 in Series, USDA Cooperative Plant Pest Report, 3(48-52):731-734, 1978

Vernon, B. and P. Pats 1997. Distribution of two European wireworms, *Agrioted lineatus* and *A. obscurus* in British Columbia. Journal of the Entomological Society of British Columbia, Vol. 94, December 1997, pp.59-61

Links to additional wireworm information (Internet sites valid as of Dec. 30, 2004)
http://whatcom.wsu.edu/ag/homehort/pest/wireworm.htm
http://www.pherotech.com/vernon_beetle_trap.html
http://wlapwww.gov.bc.ca/vir/pp/ipm/insects/wireworm.html
http://www.ipm.uiuc.edu/bulletin/article.php?issueNumber=1&issueYear=2004&articleNumber=6
http://www.inra.fr/Internet/Produits/HYPPZ/RAVAGEUR/6agrlin.htm

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